<u>IN THE CLAIMS</u>

The following is a complete listing of the claims. This listing replaces all earlier versions and listings of the claims.

Claim 1 (currently amended): An image processing apparatus comprising:

labeling means for extracting frame image data from moving image data, segmenting the frame image data into blocks, and <u>respectively</u> assigning<u>, to the blocks,</u> labels in accordance with feature amounts obtained in units of <u>the</u> blocks;

sequential label set generation means for generating a sequential label set by arranging the labels assigned by said labeling means in a predetermined block order;

sequential label set accumulation means for accumulating the sequential label set generated by said sequential label set generation means in connection with the frame image data;

similarity computation means for computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group;

scene change detection means for detecting a scene change frame in the moving image ~~from a group of computed~~ <u>based on the</u> similarities <u>computed by said similarity computation means</u>; and

scene change storage means for storing information of the detected scene change frame in connection with the frame image data.

Claim 2 (currently amended): [[The]] An apparatus according to claim 1, wherein the information of the detected scene change frame includes the number of frames or an elapsed time from the beginning of the moving image to the detected scene change frame.

Claim 3 (currently amended): [[The]] An apparatus according to claim 1, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and said labeling means computes a feature amount for each block, and assigns to that block a label given to the cell to which the computed feature amount belongs.

Claim 4 (currently amended): [[The]] An apparatus according to claim 3, wherein the moving image is a color image, the feature amount corresponds to a position of a color element value in the multi-dimensional feature amount space, and the labels are unique labels given to individual cells obtained by segmenting the multi-dimensional feature amount space into a plurality of cells.

Claim 5 (currently amended): [[The]] An apparatus according to claim 1, wherein the plurality of blocks are obtained by segmenting an image into a plurality of vertical and horizontal blocks, and the block order used [[in]] by said sequential label set generation means is an order in which the plurality of blocks are scanned in a horizontal or vertical direction.

Claim 6 (currently amended): [[The]] An apparatus according to claim 1, wherein said scene change detection means comprises determination means for determining a scene change when the similarity computed by said similarity computation means is not more than a predetermined value.

Claim 7 (currently amended): [[The]] An apparatus according to claim 1, wherein said similarity computation means has a penalty table for holding penalty values in correspondence with pairs of label values, acquires penalty values by referring to [[said]] the penalty table using pairs of label values obtained from a sequential label set of the frame image data of a scene change frame candidate and sequential label sets of the previous frame image data group, and computes the similarity on the basis of the acquired penalty values.

Claim 8 (currently amended): [[The]] An apparatus according to claim 7, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and the penalty value is a value set based on a distance between cells expressed by two labels.

Claim 9 (currently amended): [[The]] An apparatus according to claim 7, wherein said similarity computation means also gives penalty values representing degrees of similarity of the labels upon computing the similarity between the sequential label set of the frame image data of the scene change frame candidate and the sequential label sets of the previous frame image data group.

Claim 10 (currently amended): [[The]] An apparatus according to claim 7, wherein said similarity computation means computes the similarities by DP matching, using the penalty values.

Claim 11 (currently amended): [[The]] An apparatus according to claim 10, wherein said similarity computation means further comprises setting means for setting a width of a matching window of DP matching to be used.

Claim 12 (currently amended): [[The]] An apparatus according to claim 1, wherein the sequential label set represents a two-dimensional label matrix set, and said similarity computation means comprises:

first matching means for corresponding sequential label sets in units of lines extracted from a label matrix of frame image data of a scene change frame candidate, and sequential label sets in units of lines extracted from a label matrix of previous frame image data by DP matching to obtain a line arrangement of the extracted the extracted image data; and

second matching means for obtaining a similarity between a line arrangement of the label matrix of the frame image data of the scene change frame candidate[[,]] and the line arrangement obtained by said first matching means by DP matching.

Claim 13 (currently amended): [[The]] An apparatus according to claim 12, wherein the sequential label sets in units of lines are each an arrangement corresponding to a horizontal direction of an image.

6

Claim 14 (currently amended): [[The]] An apparatus according to claim 12, wherein the sequential label sets in units of lines is an arrangement corresponding to a vertical direction of an image.

Claim 15 (currently amended): [[The]] An apparatus according to claim 12, further comprising frame determination means for determining the frame image data of the scene change frame candidate to be scene change frame image data, when the similarity obtained by said second matching means becomes is not more than a predetermined value, and similarities obtained by said second matching means as a result of the same processes for previous frame images become are not more than the predetermined value.

Claim 16 (currently amended): [[The]] An apparatus according to claim 12, wherein said first matching means has a penalty table for holding penalty values in correspondence with pairs of labels, and refers to [[said]] the penalty table upon computing a distance between a sequential label set of the frame image data of the scene change frame candidate and the sequential label set of the previous frame image data using DP matching.

Claim 17 (currently amended): [[The]] An apparatus according to claim 12, wherein said second matching means has an inter-line penalty table for holding penalty values in correspondence with pairs of line numbers in the line arrangement, and refers to the inter-line penalty table upon computing similarity between the line arrangement of the frame image data of the scene change frame candidate and the line arrangement of the previous frame image using DP matching.

Claim 18 (currently amended): [[The]] An apparatus according to claim 17, further comprising penalty holding means for determining penalty values corresponding to pairs of lines on the basis of similarities of sequential label sets of the frame image data of the scene change frame candidate in the line direction, and holding the determined penalty values as the inter-line penalty table.

Claim 19 (currently amended): [[The]] An apparatus according to claim 14, wherein said first matching means gives a penalty and constraint upon scaling a sequential label set to be compared when similarity between a label sequence of source image data and a sequential label set stored in said storage means is computed.

Claim 20 (currently amended): [[The]] An apparatus according to claim 19, wherein the penalty and constraint upon scaling the sequential label set to be compared are acquired on the basis of a theory of DP matching.

Claim 21 (currently amended): [[The]] An apparatus according to claim 12, further comprising first matching window setting means for setting a width of a matching window of DP matching used by said first matching means.

Claim 22 (currently amended): [[The]] An apparatus according to claim 12, further comprising second matching window setting means for setting a width of a matching window of DP matching used by said second matching means.

8

Claim 23 (currently amended): A scene change detection method comprising the steps of:

extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts obtained in units of blocks;

generating a sequential label set by arranging the assigned labels in a predetermined block order;

computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group; and

detecting a scene change frame in the moving image ~~from a group of~~ based on the computed similarities.

Claim 24 (currently amended): [[The]] A method according to claim 23, wherein information of the detected scene change frame includes the number of frames or an elapsed time from the beginning of the moving image to the detected scene change frame.

Claim 25 (currently amended): [[The]] A method according to claim 23, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and [[the]] said extracting and assigning step ~~of assigning the labels~~ includes the step of computing a feature amount for each block, and assigning to that block a label given to the cell to which the computed feature amount belongs.

9

Claim 26 (currently amended): [[The]] A method according to claim 25, wherein the moving image is a color image, the feature amount corresponds to a position of a color element value in the multi-dimensional feature amount space, and the labels are unique labels given to cells obtained by segmenting the multi-dimensional feature amount space into a plurality of cells.

Claim 27 (currently amended): [[The]] A method according to claim 23, wherein the plurality of blocks are obtained by segmenting an image into a plurality of vertical and horizontal blocks, and the block order used in [[the]] said sequential label set generating step of generating the sequential label set is an order in which the plurality of blocks are scanned in a horizontal or vertical direction.

Claim 28 (currently amended): [[The]] A method according to claim 23, wherein [[the]] said scene change detecting step of detecting a scene change includes the step of determining a scene change when the similarity computed in [[the]] said similarity computing step of computing similarities is not more than a predetermined value.

Claim 29 (currently amended): [[The]] A method according to claim 23, wherein [[the]] said similarity computing step of computing similarities uses a penalty table for holding penalty vales in correspondence with pairs of label values, and includes the step of acquiring penalty values by referring to the penalty table using pairs of label values obtained from a label sequence of the frame image data of a scene change frame candidate and label sequences of the previous frame image data group, and computing the similarities on the basis of the acquired penalty values.

Claim 30 (currently amended): [[The]] A method according to claim 29, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and the penalty value is a value set based on a distance between cells expressed by two labels.

Claim 31 (currently amended): [[The]] A method according to claim 29, wherein [[the]] said similarity computing step of computing similarities includes the step of also giving penalty values representing degrees of similarity of labels upon computing the similarity between the sequential label set of the frame image data of the scene change frame candidate and the label sequence of the previous frame image data.

Claim 32 (currently amended): [[The]] A method according to claim 29, wherein [[the]] said similarity computing step of computing similarities includes the step of computing the similarities by DP matching using the penalty values.

Claim 33 (currently amended): [[The]] A method according to claim 32, wherein [[the]] said similarity computing step of computing similarities includes the step of setting a width of a matching window of DP matching to be used.

Claim 34 (currently amended): [[The]] A method according to claim 23, wherein the sequential label set represents a two-dimensional label matrix, and [[the]] said similarity computing step of computing similarities includes:

[[the]] a first matching step, of corresponding sequential label sets in units of lines extracted from a label matrix of frame image data of a scene change frame

11

candidate, and sequential label sets in units of lines extracted from a label matrix of previous frame image data by DP matching to obtain a line arrangement of the extracted the extracted image data; and

[[the]] a second matching step, of obtaining similarity between a line arrangement of the label matrix of the frame image data of the scene change frame candidate, and the obtained line arrangement by DP matching.

Claim 35 (currently amended): [[The]] A method according to claim 34, wherein the sequential label sets in units of lines are each an arrangement corresponding to a horizontal direction of an image.

Claim 36 (currently amended): [[The]] A method according to claim 34, wherein the sequential label sets in units of lines are each an arrangement corresponding to a vertical direction of an image.

Claim 37 (currently amended): [[The]] A method according to claim 34, wherein the frame image data of the scene change frame candidate is determined to be scene change frame image data, when the similarity obtained in [[the]] said second matching step becomes is not more than a predetermined value, and similarities obtained in [[the]] said second matching step as a result of the same processes for previous frame images become are not more than the predetermined value.

Claim 38 (currently amended): [[The]] A method according to claim 34, wherein [[the]] said first matching step uses a penalty table for holding penalty values in

12

correspondence with pairs of labels, and includes the step of referring to the penalty table

upon computing a distance between a sequential label set of the frame image data of the

scene change frame candidate and the sequential label set of the previous frame image data

using DP matching.

Claim 39 (currently amended): [[The]] A method according to claim 34,

wherein [[the]] said second matching step uses an inter-line penalty table for holding

penalty values in correspondence with pairs of line numbers in the line arrangement, and

includes the step of referring to the inter-line penalty table upon computing similarity

between the line arrangement of the frame image data of the scene change frame candidate

and the line arrangement of the previous frame image using DP matching.

Claim 40 (currently amended): [[The]] A method according to claim 39,

wherein penalty values corresponding to pairs of lines are determined on the basis of

similarities of sequential label sets of the frame image data of the scene change frame

candidate in the line direction, and the determined penalty values are held as the inter-line

penalty table.

Claim 41 (currently amended): [[The]] A method according to claim 36,

wherein [[the]] said first matching step includes the step of giving a penalty and constraint

upon scaling a sequential label set to be compared when similarity between a sequential

label set of source image data and a sequential label set stored in storage means is

computed.

Claim 42 (currently amended): [[The]] A method according to claim 41, wherein the penalty and constraint upon scaling the sequential label set to be compared are acquired on the basis of a theory of DP matching.

Claim 43 (currently amended): [[The]] A method according to claim 34, wherein a width of a matching window of DP matching used in [[the]] said first matching step is set.

Claim 44 (currently amended): [[The]] A method according to claim 34, wherein a width of a matching window of DP matching used in [[the]] said second matching step is set.

Claim 45 (currently amended): A storage medium for storing a control program for making a computer execute a scene change detection method, said control program including method comprising the steps of:

the step of extracting frame image data from moving image data, segmenting the frame image data into blocks, and respectively assigning, to the blocks, labels in accordance with feature amounts acquired obtained in units of the blocks;

the step of generating a sequential label set by arranging the assigned labels in a predetermined block order;

the step of computing similarities between the generated sequential label set and sequential label sets of a previous frame image data group; and

the step of detecting a scene change frame in the moving image from a based on the computed similarity group similarities.

14

Claim 46 (currently amended): [[The]] A medium according to claim 45, wherein the labels are unique labels which are given to individual cells obtained by segmenting a multi-dimensional feature amount space into a plurality of cells, and [[the]] said extracting and assigning step of assigning the labels includes the step of computing a feature amount for each block, and assigning to that block a label given to the cell to which the computed feature amount belongs.

Claim 47 (currently amended): [[The]] A medium according to claim 45, wherein [[the]] said similarity computing step of computing similarities includes the step of computing the similarities by DP matching using penalty values.

Claim 48 (currently amended): [[The]] A medium according to claim 45, wherein the sequential label set represents a two-dimensional label matrix, and [[the]] said similarity computing step of computing similarities includes:

[[the]] a first matching step, of corresponding sequential label sets in units of lines extracted from a label matrix of frame image data of a scene change frame candidate, and sequential label sets in units of lines extracted from a label matrix of previous frame image data by DP matching to obtain a line arrangement of the extracted the extracted image data; and

[[the]] a second matching step, of obtaining a similarity between a line arrangement of the label matrix of the frame image data of the scene change frame candidate, and the obtained line arrangement by DP matching.

15

Claim 49 (currently amended): [[The]] A medium according to claim 48, wherein the frame image data of the scene change frame candidate is determined to be scene change frame image data, when the similarity obtained in [[the]] said second matching step becomes not more than a predetermined value, and similarities obtained in [[the]] said second matching step as a result of the same processes for previous frame images become not more than the predetermined value.

Claim 50 (currently amended): [[The]] A medium according to claim 48, wherein [[the]] said first matching step uses a penalty table for holding penalty values in correspondence with pairs of labels, and includes the step of referring to the penalty table upon computing a distance between a sequential label set of the frame image data of the scene change frame candidate and the sequential label set of the previous frame image data using DP matching.

Claim 51 (currently amended): [[The]] A medium according to claim 48, wherein [[the]] said second matching step uses an inter-line penalty table for holding penalty values in correspondence with pairs of line numbers in the line arrangement, and includes the step of referring to the inter-line penalty table upon computing similarity between the line arrangement of the frame image data of the scene change frame candidate and the line arrangement of the previous frame image using DP matching.

Claim 52 (currently amended): [[The]] A medium according to claim 45, wherein said control program further includes the step of determining penalty values corresponding to pairs of lines on the basis of similarities of sequential label sets of the

16

frame image data of the scene change frame candidate in the line direction, and holding the determined penalty values as the inter-line penalty table.

Claim 53 (currently amended): [[The]] A medium according to claim 48, wherein [[the]] a first matching step includes the step of giving a penalty and constraint upon scaling a sequential label set to be compared when similarity between a label sequence of source image data and a sequential label set stored in storage means is computed.

Claim 54 (currently amended): [[The]] A medium according to claim 48, wherein [[the]] said first matching step and/or [[the]] said second matching step include/includes the step of setting a width of a matching window of DP matching used.

Claim 55 (currently amended): [[The]] An apparatus according to claim 11, wherein when [[the]] said apparatus is equipped in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.

Claim 56 (currently amended): [[The]] A method according to claim 33, wherein in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.

Claim 57 (currently amended): [[The]] A medium according to claim 45 wherein in a movie, the width of a matching window is changed in accordance with a mount of shaking detected by a sensor.